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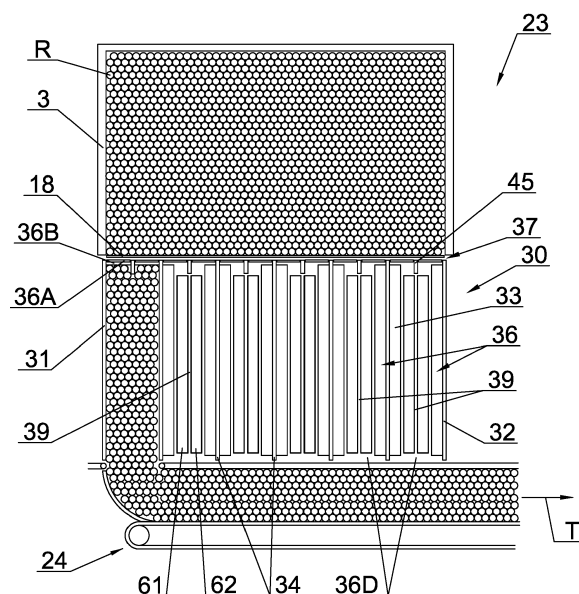
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(54) **INTERMEDIATE STORE AND APPARATUS OF TOBACCO INDUSTRY**

(57) The object of the invention is an intermediate store (30) in an apparatus (1) of the tobacco industry for the vertical transport of rod-like articles (R), comprising sidewalls (31, 32), a back wall (33), and a plurality of partitions (34) dividing the intermediate store (30) into vertical channels (36) which are adapted to receive the rod-like articles (R) from above, the axes of the rod-like articles being situated parallel to the sidewalls (31, 32). The intermediate store (30) is provided with a movable transferring element (37) being slidable relative to the partitions (34) of the intermediate store (30), in addition, the transferring element (37) comprising supporting plates (36A) which support the mass flow of the rod-like articles (R) in the vertical channels (36) of the intermediate store (30) above the supporting plates (36A). The supporting plates (36A) are adapted to move downwards (A) within the vertical channels (36) and to move upwards (C) outside of the vertical channels (36). The back wall (33) is provided with at least one slot (39) along which the supporting plate (36A) moves, in addition, the supporting plates (36A) are adapted to being put into the channels (36) in the inlet area (36C) of the channels and to be pulled out of the vertical channels (36) in the outlet area (36E) of the channels. The store according to the invention is characterised by being provided with at least one movable wall element (61, 62, 81, 91, 92) being slidable so that it may take at least two positions, whereas one position of the movable wall element (61, 62, 81, 91, 92) is located in the slot (39), and another position of the movable wall element is located outside of the slot (39).



**Fig. 5**

## Description

**[0001]** The object of the invention is an intermediate store and an apparatus of the tobacco industry.

**[0002]** Rod-like articles i.e. cigarettes, filter-tipped cigarettes, cigarillos, cigars, filter rods, multi-segment filter rods manufactured in the tobacco industry are very frequently stored in trays. The storage of the rod-like articles may be a long-term storage, i.e. in a warehouse, or a short-term storage, i.e. between successive operations in the production process. In both cases, it is necessary to unload the trays in order to feed the articles into the production machine. In known apparatuses, where the mass flow is fed into vertical channels, narrow slots are used. For this reason, the mechanisms for the transferring of rod-like articles are not rigid enough and easily deformable.

**[0003]** Apparatuses for feeding of rod-like-articles into a hopper are known from the prior art, for example from the document EP1020126A1, and apparatuses for feeding of rod-like articles into an intermediate store are known from the application PL 419 033.

**[0004]** The object of the invention is an intermediate store in an apparatus of the tobacco industry for the vertical transport of rod-like articles, comprising sidewalls, a back wall, and a plurality of partitions dividing the intermediate store into vertical channels which are adapted to receive the rod-like articles from above, with the axes of the rod-like articles being situated parallel to the sidewalls. The intermediate store is provided with a movable transferring element being slidable relative to the partitions of the intermediate store; in addition, the transferring element comprising supporting plates which support the mass flow of the rod-like articles in vertical channels of the intermediate store above the supporting plates. The supporting plates are adapted to move downwards within the vertical channels and to move upwards outside of the vertical channels. The back wall is provided with at least one slot along which the supporting plate moves, in addition, the supporting plates are adapted to be put into the channels in the inlet area of the channels and pulled out of the vertical channels in the outlet area of the channels. The store according to the invention is characterised in that the store is provided with at least one movable wall element being slidable so that it may take at least two positions, whereas one position of the movable wall element is located in the slot, and another position of the movable wall element is located outside the slot.

**[0005]** The store according to the invention is characterised in that the movable wall element has the form of a flat slat.

**[0006]** The store according to the invention is characterised in that the movable wall element is rotatably mounted on the axis of rotation parallel to the back wall.

**[0007]** The store according to the invention is characterised in that the movable wall elements of adjacent channels are connected by tie bars which are connected

by a joint.

**[0008]** The store according to the invention is characterised in that the joints are attached to a linear drive.

**[0009]** The store according to the invention is characterised in that the movable wall element is slidably mounted.

**[0010]** The store according to the invention is characterised in that the movable wall element makes a movement composed of rotational and linear motion.

**[0011]** The store according to the invention is characterised in that the movable wall element is provided for each channel.

**[0012]** The store according to the invention is characterised in that the supporting plate when being put into the channel takes a position above the movable wall element.

**[0013]** The store according to the invention is characterised in that the supporting plate when being pulled out of the channel takes a position below the movable wall element.

**[0014]** Moreover, the object of the invention is an apparatus for unloading the trays filled with the rod-like articles provided with a filled tray station, a turning unit to turn the filled tray, a filled tray emptying station, and an empty tray station. The apparatus is characterised by being provided with an intermediate store according to the invention.

**[0015]** The object of the invention was shown in detail in a preferred embodiment in a drawing in which:

Fig. 1 shows a filled tray,

Fig. 2 shows a tray unloading apparatus in a side view,

Fig. 3 shows a handling unit in a side view,

Fig. 4 shows the tray unloading apparatus in the side view, whereas the tray is in a position just before unloading,

Fig. 5 shows an intermediate store in a front view and the filled tray before unloading,

Fig. 6, 7, 8 show the intermediate store in a first embodiment in a top view,

Fig. 6a shows a magnified fragment of Fig. 6,

Fig. 8a shows a magnified fragment of Fig. 8

Fig. 9a, 9b, 10 show embodiments of movable wall elements,

Fig. 11 shows the intermediate store in a second embodiment in a top view,

Fig. 12 shows the intermediate store in a side view,

Fig. 13 shows a filled intermediate store in a front view and an unloaded tray.

**[0016]** In this description, the invention will be described in relation to a tray 3 shown in simplified terms in Fig. 1, being unloaded on a tray emptying apparatus. The invention concerns various machines at which both single- and multi-chamber tray emptying process takes place.

**[0017]** The tray 3 was shown as filled in an upright position, i.e. such a position in which the filled trays are placed on the filled tray station of the filled tray emptying machine. The filled space of the tray was marked by hatching with lines, whereas several example rod-like articles R lying at the bottom of the tray were shown. In such upright position, the filled tray is placed by the operator on the filled tray station, whereas the operator holds the tray by the sidewalls 3L and 3R in such a way that he can see the interior of the tray. The expressions like upper, bottom, lateral, front and back will refer to the position of the tray shown in Fig. 1, the front side, left lateral side and upper side of the tray 3 being visible therein. The tray 3 has a bottom wall 3B on which it stands, a back wall 3A and two lateral walls, a left lateral wall 3L and a right lateral wall 3R, whereas the designation of the sides refers to the position in which the tray can be seen by the operator placing a filled tray on the filled tray station, the open front side 3G of the trays 3 being directed towards him. The filling and the emptying of the tray takes place through the open side 3T.

**[0018]** For the purpose of simplification, the units belonging to the tray emptying apparatus 1 according to the invention were shown in Fig. 2 in simplified terms without drive mechanisms; the outer contour of the apparatus 1 was shown with a dashed line. The tray emptying apparatus 1 is provided with a filled tray station 2 on which the filled trays 3 to be unloaded are placed by the operator. From the filled tray station 2 the trays 3 are delivered one by one according to the principle that the first filled tray 3' is transferred to a lifting unit 6, whereas a plurality of filled trays 3 are collected on the station 2. The lifting unit 6 lifts the transferred filled tray 3 to a height at which the filled tray 3 may be gripped by the turning unit 10 shown in Fig. 3. The turning unit 10 is adapted to turn the filled tray 3 before unloading it at the filled tray emptying station 23. The turning unit 10 is attached to a rotating shaft 12 with the axis of rotation 12A on a slide 11A of the lifting unit 11. The turning unit 10 and the lifting unit 11 constitute a handling unit 19. During the tray emptying cycle the tray 3 is lifted, turned and moved away from the axis of rotation 12A. The tray emptying apparatus 1 is provided with a filled tray emptying station 23 in the front part 1A of the apparatus 1 underneath which a removing conveyor 24 receiving the rod like articles R unloaded from the trays 3 is situated. The filled tray emptying station 23 comprises an intermediate store 30 and a removing conveyor 24 designed to remove the rod-like articles R from the apparatus 1. Fig. 4 shows a situation

where the tray 3 is in a position just before unloading, i.e. before transferring the rod-like articles R contained in the tray 3 to the intermediate store 30, whereas such transferring takes place after positioning the tray 3 directly before the intermediate store 30 and withdrawing a supporting plate 18. In the back part 1B of the tray emptying apparatus 1, an empty tray station 25 is situated. The apparatus 1 may be intended for the emptying of plastic four-wall trays as well as for the emptying of cardboard five-wall trays, an apparatus for the emptying of four-wall and five-wall trays was described in the patent application PL417941 belonging to the applicant. An embodiment of the intermediate store 30 was described in the patent application PL419033 also belonging to the applicant. The tray emptying apparatus 1 is provided with a controller 40 shown in Fig. 2, connected to individual units of the apparatus 1.

**[0019]** The intermediate store 30 according to the invention shown in Figs. 5 do 8 has a left sidewall 31 and a right sidewall 32 as well as a back wall 33. Furthermore, the intermediate store 30 has a plurality of partitions 34 which divide the space of the intermediate store 30 into a plurality of vertical channels 36. The channels 36 at the inlets 36C may be provided with dividing partitions 45 situated in the half of the width of the vertical channels 36. The intermediate store 30 may be provided with channels of equal or different width. The intermediate store 30 in the multi-channel form is provided with a movable transferring element 37 which is slidably mounted relative to the partitions 36 of the intermediate store 30 and is used to transfer the mass flow of the rod-like articles R under the influence of the force of gravity in individual channels 36 of the intermediate store 30 downwards parallel to the partitions 34. For this purpose, the transferring element 37 is provided with a plurality of supporting plates 36A which are adapted to support the mass flow of the rod-like articles R in the vertical channels 36, whereas in view of the presence of the partitions 45 two supporting plates 36A connected by the brackets 38 are provided per each channel 36. The supporting plates 36A are situated horizontally and perpendicular to the back wall 33 of the intermediate store 30. The brackets 38 are attached to a load-bearing element 42, during the transfer of the rod-like articles R the brackets 38 move along the vertical slots 39 made in the back wall 33 of the intermediate store 30. The load-bearing element 42 is attached to a slider 47 and a guide 43 and may move in the perpendicular direction to the back wall 33. The transferring element 37 together with the load-bearing element 42, the slider 47 and the guide 43 are attached to the slider 48 slidably mounted in the vertical direction on the guide 44 (Fig. 12). Such fastening of the transferring element 37 enables this element to move in the directions A, B, C, D. For the purpose of simplification, the drive elements used to move the load-bearing element 42 in the horizontal direction as well as to move the slider 48 in the vertical direction were not shown.

**[0020]** The intermediate store according to the inven-

tion is provided with movable wall elements. The movable wall elements are slidably mounted so that in one position they are situated in the slot of the back wall, and in another at least one position outside of this slot. In particular, the store 30 is provided with at least one movable wall element 61, 62, 81, 91, 92 which is slidable so that it may take at least two positions, whereas one position of the movable wall element 61, 62, 81, 91, 92 is located in the slot 39, and another position of the movable wall element is located outside of the slot 39.

**[0021]** In Fig. 5, movable wall elements in the form of flat longitudinal elements 61, 62 are situated in the slot 39 and extend next to each other along the slot 39 in the wall 33. The mechanism 60 of the movable wall elements 61, 62 is shown also in a top view in Figs. 6 and 8, and in magnification in Figs. 6a and 8a. One position of the movable wall elements 61 and 62 in which these elements are situated in the slot 39 is shown in Fig. 6a, another position in which these elements are situated outside of the slot 39 is shown in Fig. 8a. The movable wall elements 61, 62 are situated in the slot 39 along the channels 36. The movable wall element 61 is rotatably mounted on the axis 63, whereas the movable wall element 62 is rotatably mounted on the axis 64, whereas the axes 63 and 64 are situated parallel to the wall 33. The movable wall element 61 is moved by means of a tie bar 65 by the joint 67, whereas a not shown drive element moves the joint 69 in the direction M being perpendicular to the wall 33. The movable wall element 62 is moved by means of the tie bar 66 by the joint 68, whereas a not shown drive element moves the joint 70 in the direction L being perpendicular to the wall 33. The joints 69 and 70 may be connected with the movable wall elements in the adjacent channels 36. Any drive mechanism making a linear motion may be used to move the joints 69 and 70.

**[0022]** The movable wall elements 61, 62 may be attached to lever mechanisms and make movements composed of rotational and linear motion.

**[0023]** Figs. 9a and 9b show an embodiment of the mechanism 80 of the movable wall elements. The movable wall element 81 attached to an arm 82 is rotatably mounted on the axis 83, whereas in one slot 39 one movable wall element 81 is situated. Fig. 9a shows the movable wall element 81 located in the slot 39, whereas Fig. 9b shows the movable wall element 81 located outside of the slot 39.

**[0024]** Fig. 10 shows another embodiment of the mechanism 90 of the movable wall elements. The movable wall elements 91 and 92 are attached to pistons of the actuators 93 and 94 and are linearly moved at an angle to the wall 33. In the position shown, the movable wall elements are located in the slot 39, after the activating of the actuators 93 and 94 they will be moved outside the slot 39. Any other configurations of linear motion of the elements 91 and 92 are possible.

**[0025]** Fig. 11 shows an embodiment of the intermediate store 30' provided with the transferring element 37'

adapted to feed the rod-like articles R into the channels 36', whereas the channels 36' are not provided with the partitions 45. The transferring element 37' is provided with one bracket 38' to fasten all supporting plates 36A'. The bracket 38' is adapted to move along the slot 39. The mechanism 60' of the movable wall elements is built similar to the mechanism 60.

**[0026]** In Fig. 12, the movement cycle of the supporting plates 36A was shown with the arrows A, B, C, D. The supporting plates 36A of the transferring element 37 are put (arrow D) into the vertical channels 36 through upper cut-outs 36B at the inlets 36C of the channels. After putting the supporting plates 36A into the channels 36 as shown in Fig. 7, the movable wall elements 61 and 62 are moved away as shown in Fig. 8. Once the movable wall elements have been moved away, it is possible to shift the bracket 38 during the downward movement, i.e. it is possible to lower the supporting plates 36A in the channels 36. However, the movable wall elements 61 and 62 may be moved away before putting the supporting plates 36A into the channels 36. In both cases, the supporting plates 36A are situated above the movable wall elements 61 and 62. Once the supporting plates 36A have been put in, the supporting plate 18 of the turning unit 10 is withdrawn and the rods R are transferred from the tray 3 to the supporting plates 36A. At this moment, the feeding of the rods R into the channels 36 may be started, the supporting plates 36A are moved along the channels 36 in accordance with the direction of the arrow A, i.e. the mass flow of the rod-like articles R is fed into the channels 36. Once the feeding of the rods R has finished, the movable wall elements 61 and 62 are moved back into the slot 39, after which the supporting plates 36A are pulled out in accordance with the direction of the arrow B through bottom cut-outs 36D at the outlets 36E of the channels beneath the movable wall elements. Once the plates 36A have been pulled out, they are moved upwards outside of the channels 36 in accordance with the direction of the arrow C and again put into the channels 36 in accordance with the direction of the arrow D. After the supporting plates 36A have been put into the channels 36, they will wait for the delivery of another filled tray 3 or, if a filled tray 3 has already been delivered, the supporting plate 18 will be withdrawn and another cycle of the feeding of the rods R into the channels 36 will be started.

**[0027]** Underneath the intermediate store 30, there is situated a receiving conveyor 24 which is provided with a slidable chute 47 which is used to transfer the mass flow of the rod-like articles R from the vertical channels 36 onto a leading out conveyor 24 which leads out the rod-like articles R received from the vertical channels 36 of the intermediate store 30 in the removing direction T, whereas the chute 47 has a separate drive (not shown) and is adapted to move relative to the receiving conveyor 24. Above the inlet 48 of the chute 47, there is a passage 49 which is formed by a tape 50, 51. In the passage 49, there is situated a sensor 52 of presence of the rod-like

articles R. A method of emptying the successive channels 36 was shown in the application PL419033.

## Claims

1. An intermediate store (30) in an apparatus (1) of the tobacco industry for the vertical transport of rod-like articles (R), comprising sidewalls (31, 32), a back wall (33), and a plurality of partitions (34) dividing the intermediate store (30) into vertical channels (36) which are adapted to receive rod-like articles (R) from above, the axes of the rod-like articles being situated parallel to the sidewalls (31,32), whereas the intermediate store (30) is provided with a movable transferring element (37) being slidable relative to the partitions (34) of the intermediate store (30), in addition the transferring element (37) comprising supporting plates (36A) which support the mass flow of the rod-like articles (R) in the vertical channels (36) of the intermediate store (30) above the supporting plates (36A),  
whereas the supporting plates (36A) are adapted to move downwards (A) within the vertical channels (36) and move upwards (C) outside of the vertical channels (36),  
whereas the back wall (33) is provided with at least one slot (39) along which the supporting plate (36A) moves,  
in addition, the supporting plates (36A) are adapted to be put into the channels (36) in the inlet area (36C) of the channels and pulled out of the vertical channels (36) in the outlet area (36E) of the channels,  
**characterised in that**  
the store is provided with at least one movable wall element (61,62, 81, 91, 92) being slidable so that it may take at least two positions, whereas one position of the movable wall element (61,62, 81, 91, 92) is located in the slot (39), and another position of the movable wall element is located outside of the slot (39).
2. The store as in claim 1, **characterised in that** the movable wall element (61, 62, 81, 91, 92) has the form of a flat slat.
3. The store as in claim 1 or 2, **characterised in that** the movable wall element (61, 62, 81) is rotatably mounted on the axis of rotation parallel to the back wall (33).
4. The store as in claim 3, **characterised in that** the movable wall elements (61, 62) of adjacent channels (36) are connected by tie bars (65, 66) which are connected by a joint (69, 70).
5. The store as in claim 4, **characterised in that** the joints (69, 70) are attached to a linear drive.
6. The store as in claim 1 or 2, **characterised in that** the movable wall element (91, 92) is slidably mounted.
7. The store as in claim 1 or 2, **characterised in that** the movable wall element makes a movement composed of rotational and linear motion.
8. The store as in any of previous claims, **characterised in that** the movable wall element (61, 62, 81, 91, 92) is provided for each channel.
9. The store as in any of previous claims 1 to 8, **characterised in that** the supporting plate (36A) when being put into the channel (36) takes a position above the movable wall element (61, 62, 81, 91, 92).
10. The store as in any of previous claims 1 to 8, **characterised in that** the supporting plate (36A) when being pulled out of the channel (36) takes a position below the movable wall element (61, 62,81,91,92).
11. An apparatus of the tobacco industry for unloading the trays filled with rod-like articles provided with a filled tray station, a turning unit to turn the filled tray, a filled tray emptying station, and an empty tray station **characterised by** being provided with an intermediate store according to any of the claims 1 to 10.

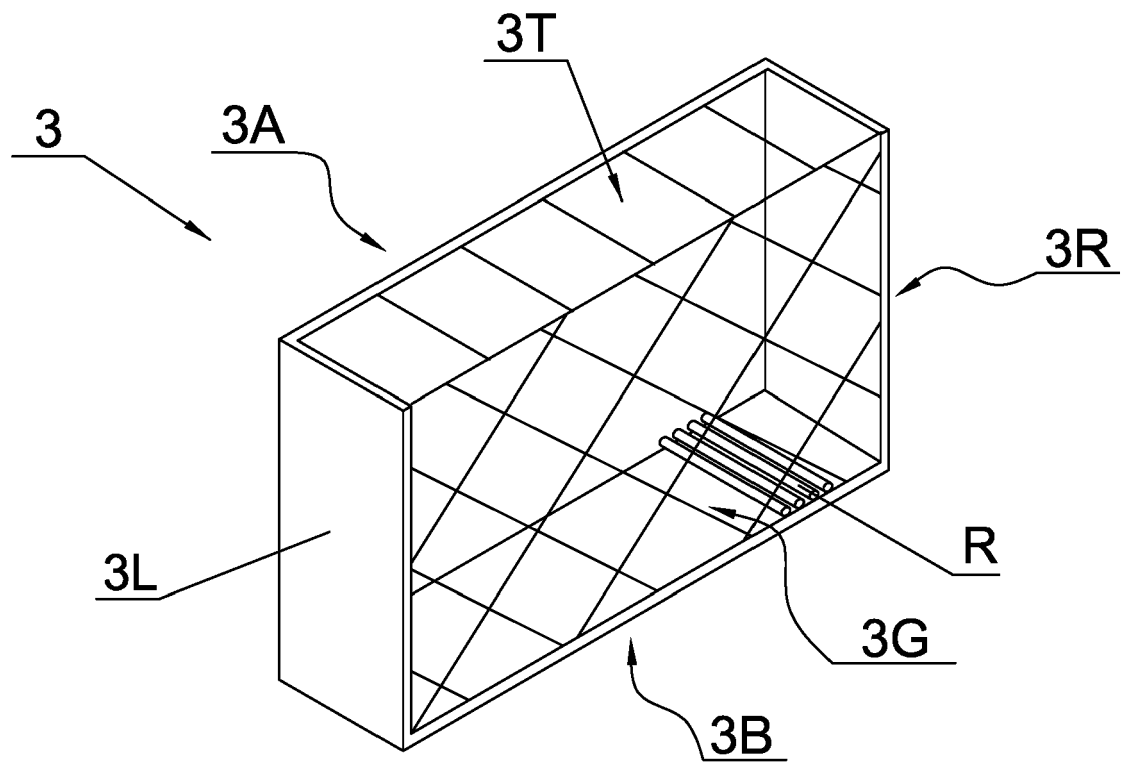


Fig. 1

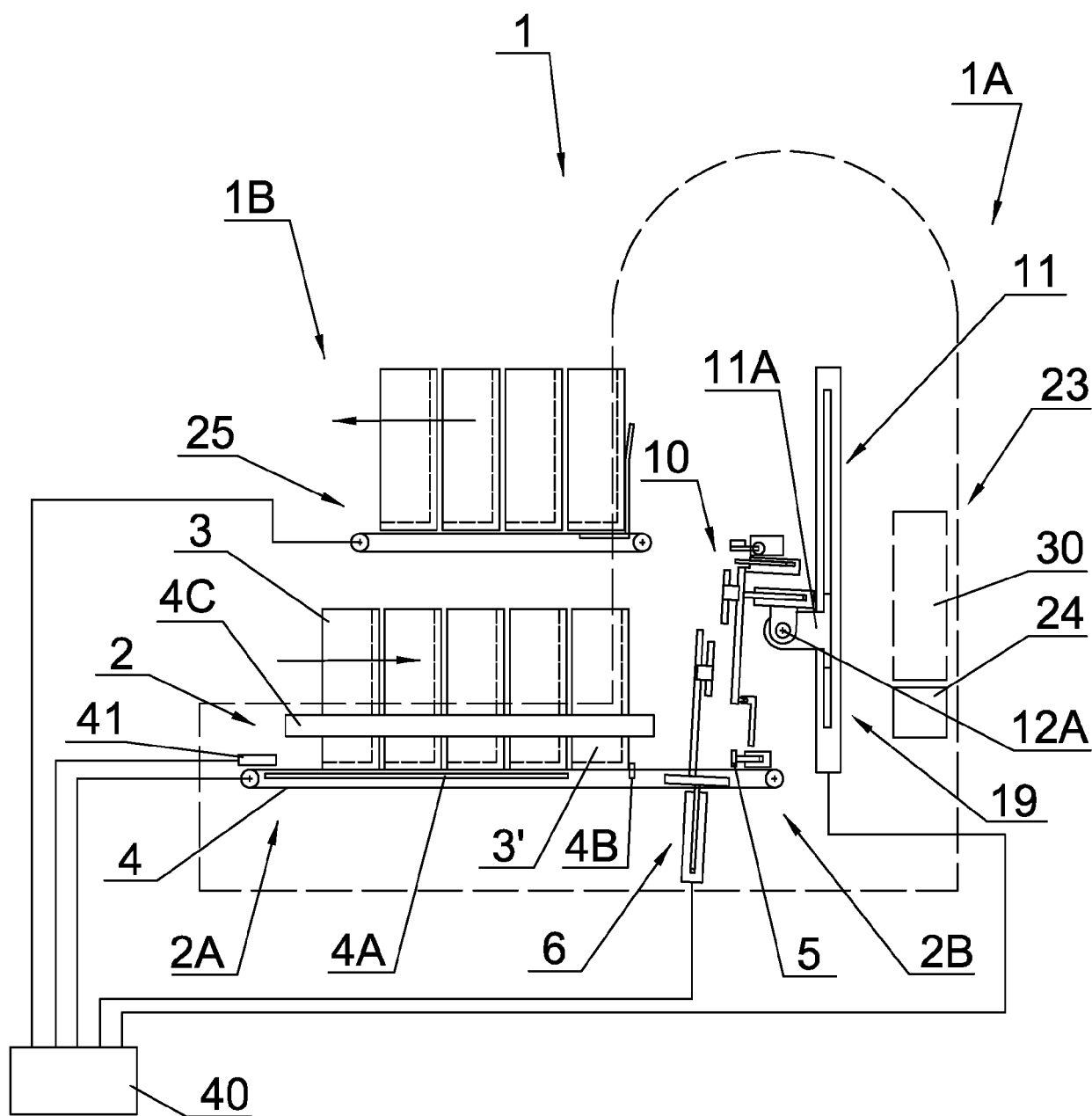


Fig. 2

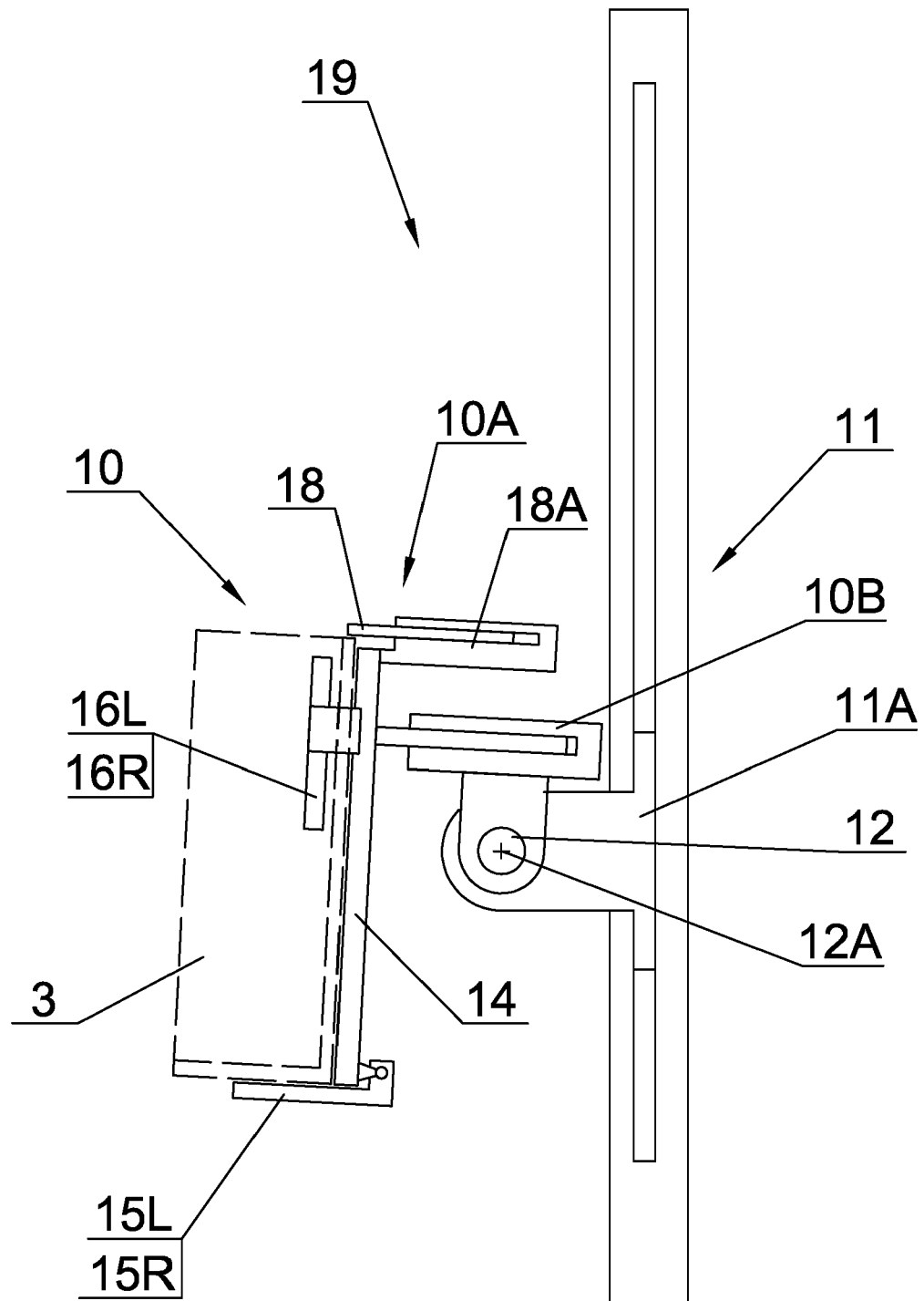


Fig. 3



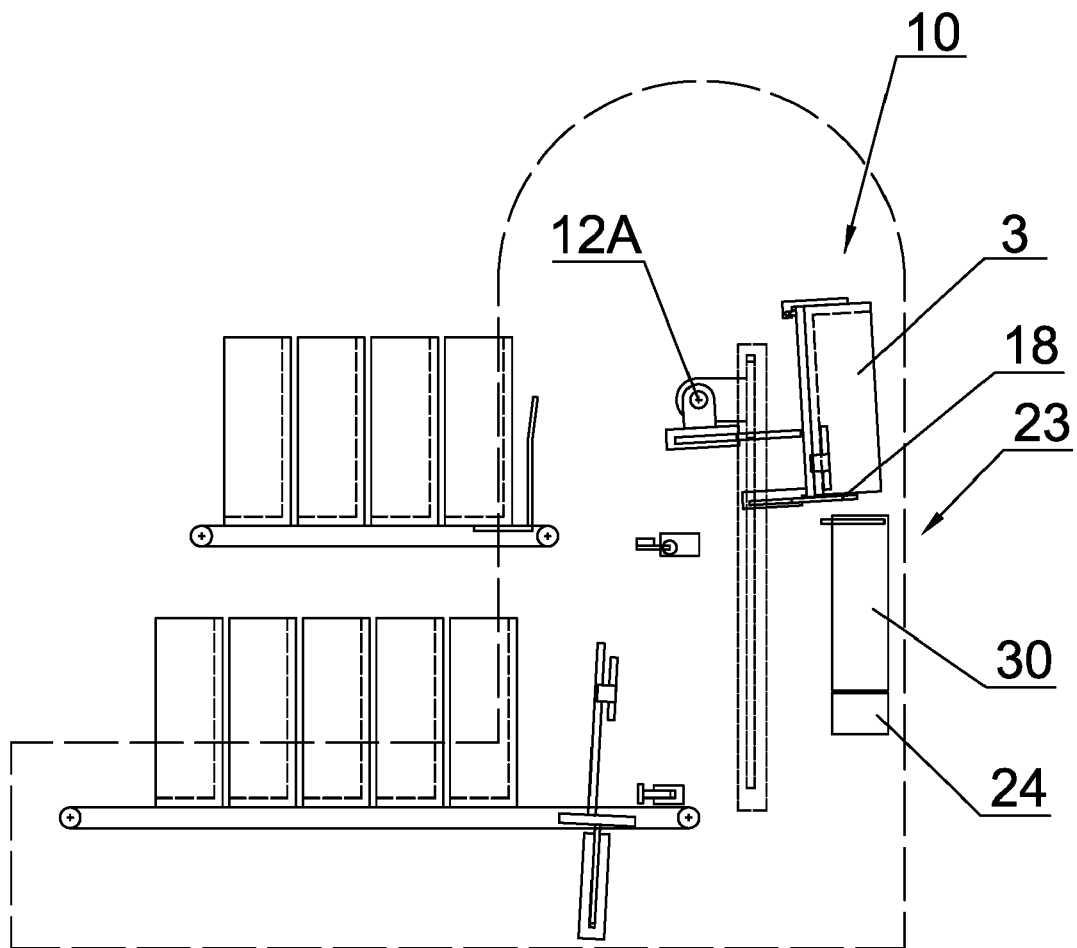


Fig. 4

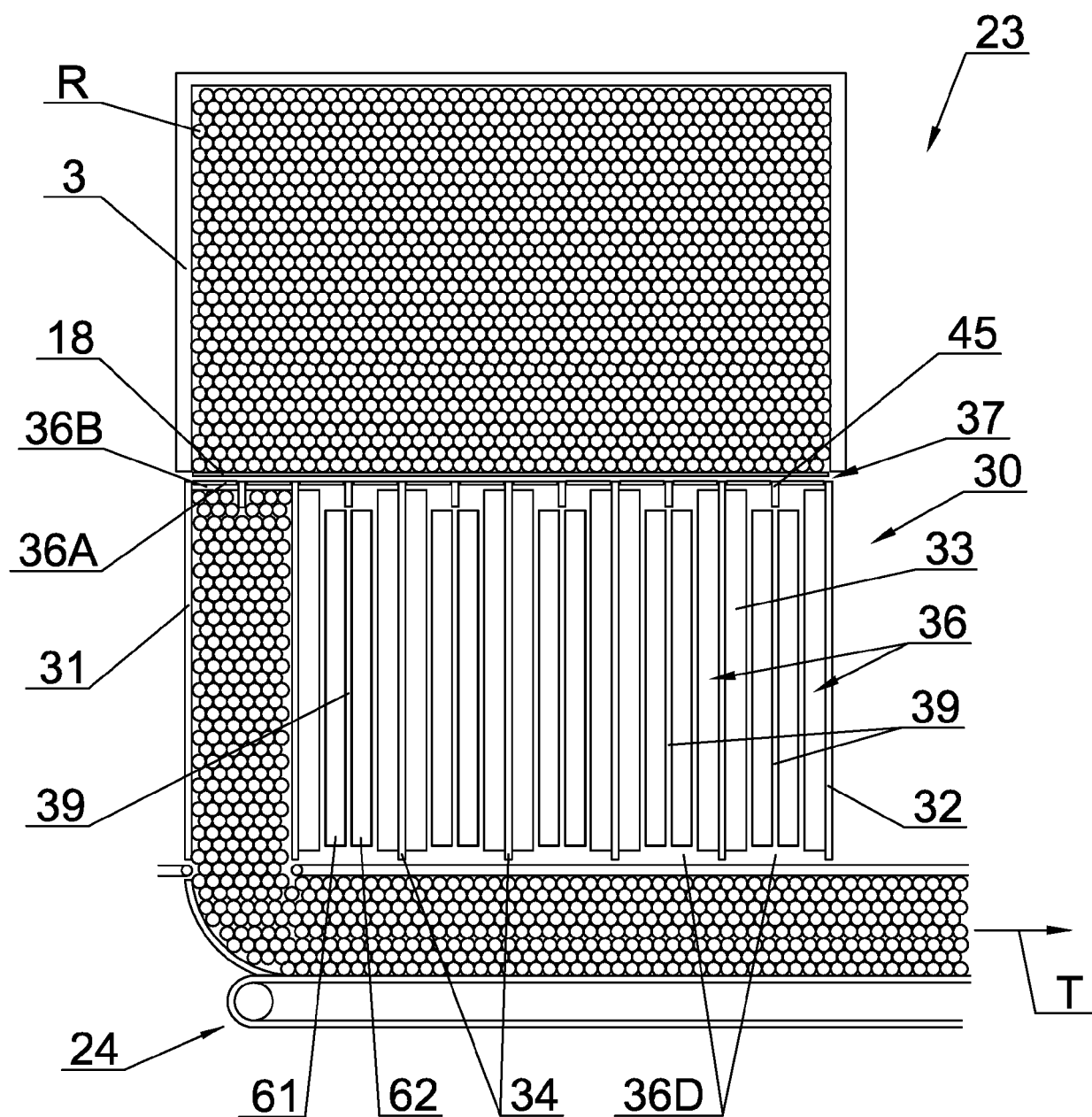


Fig. 5

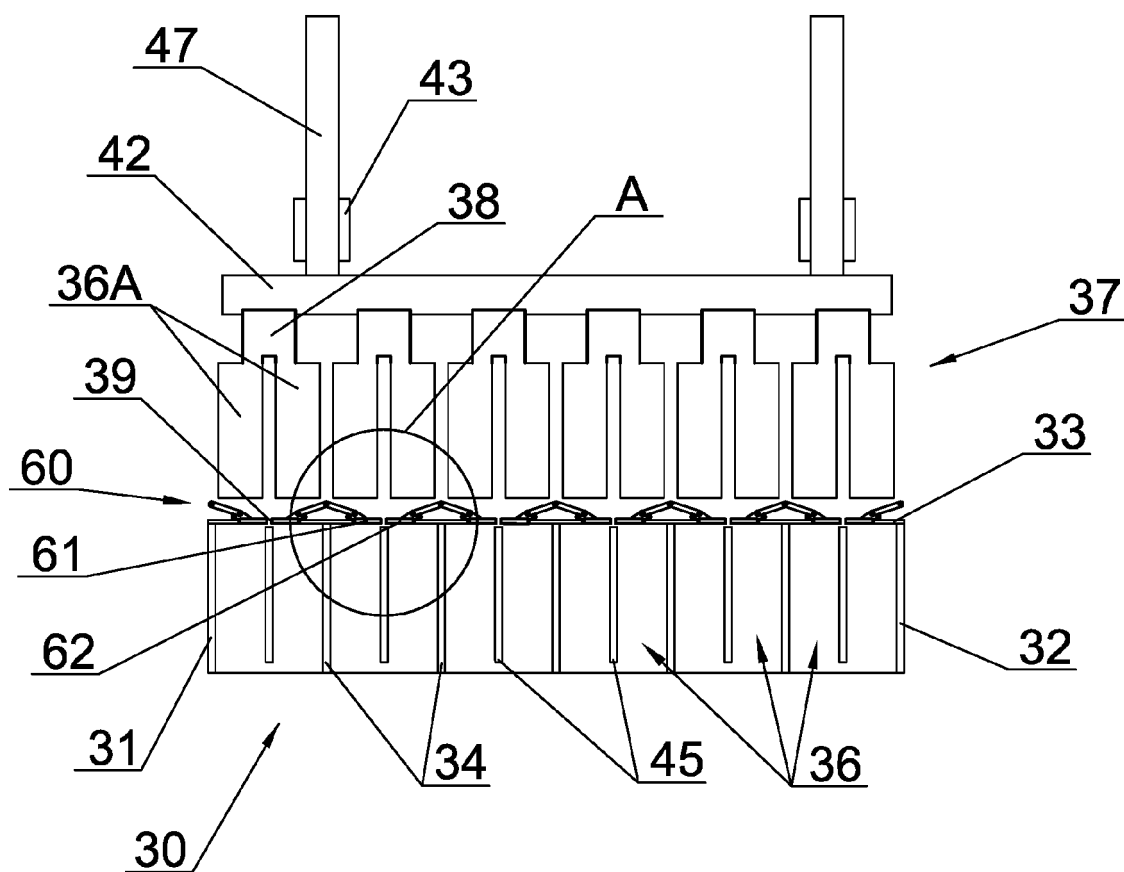


Fig. 6

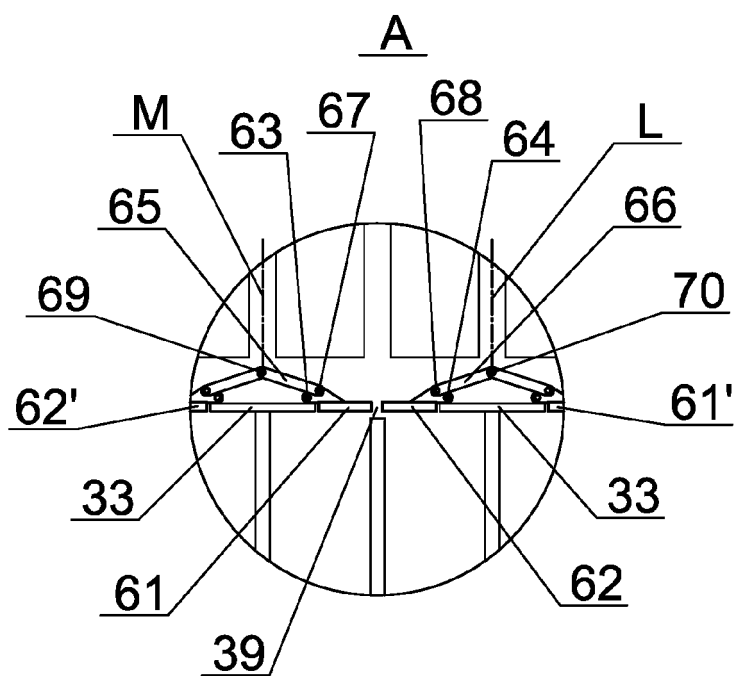
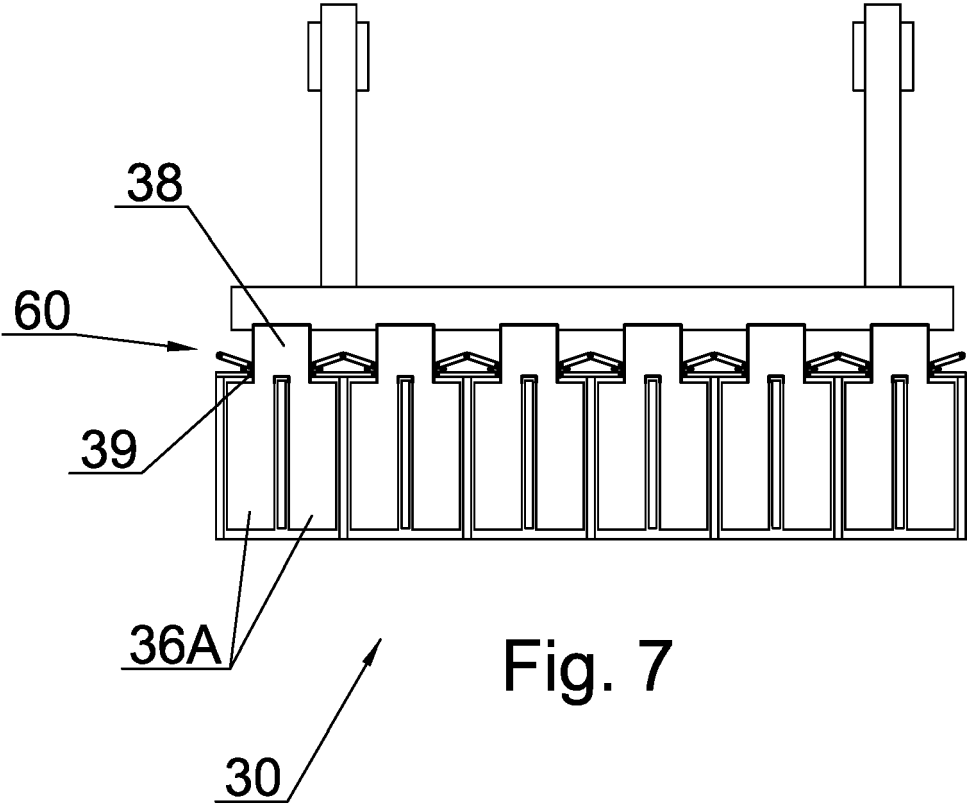


Fig. 6a



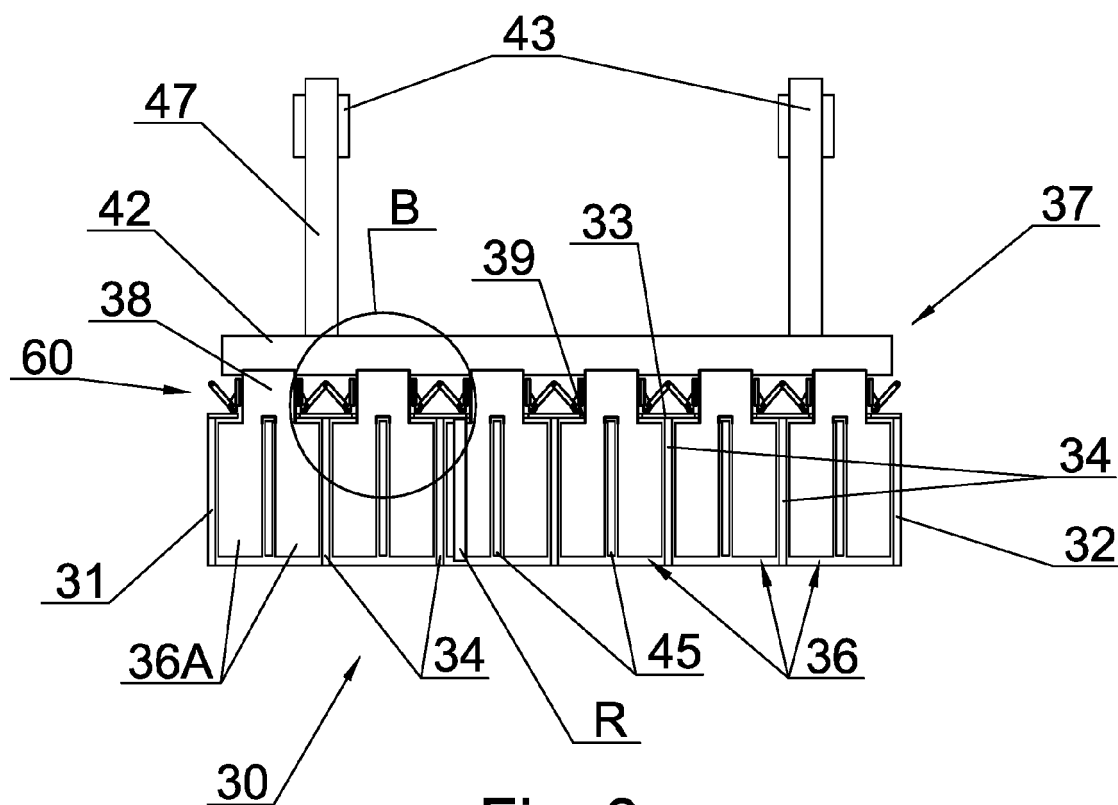


Fig. 8

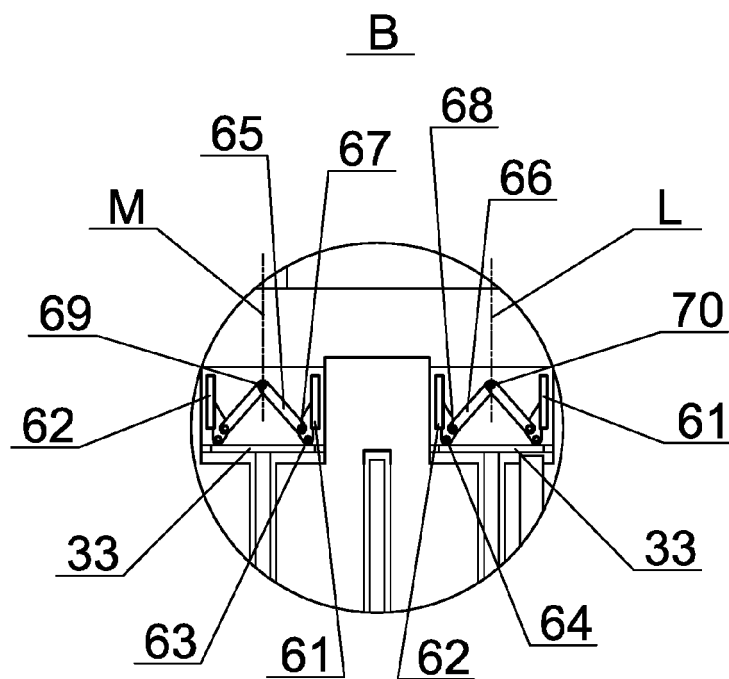


Fig. 8a

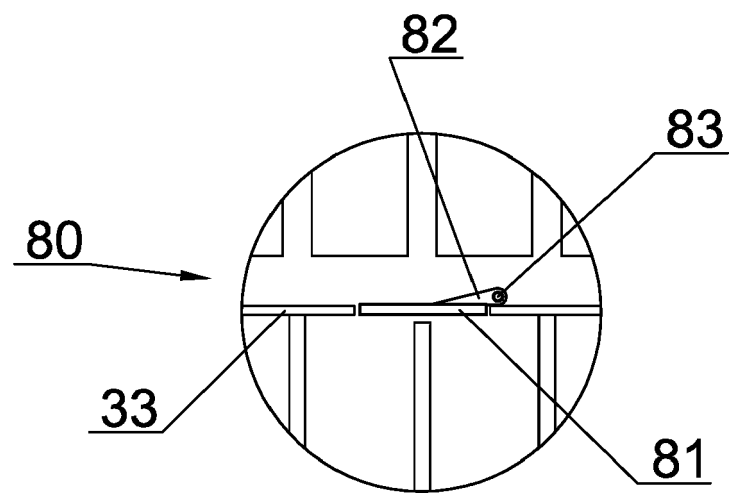


Fig. 9a

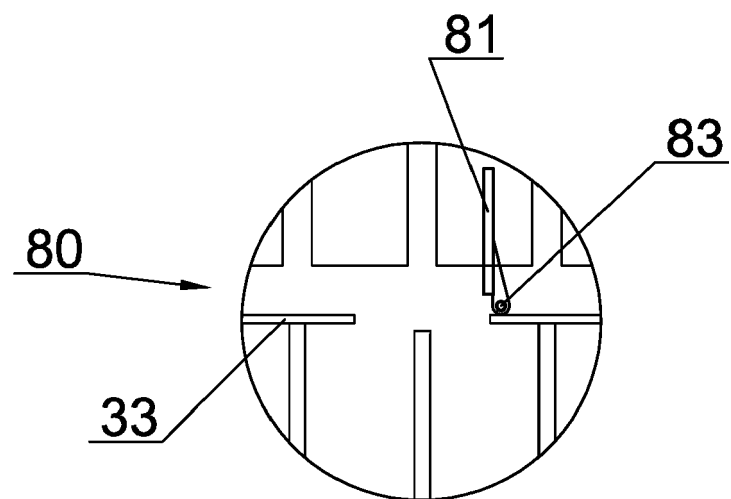


Fig. 9b

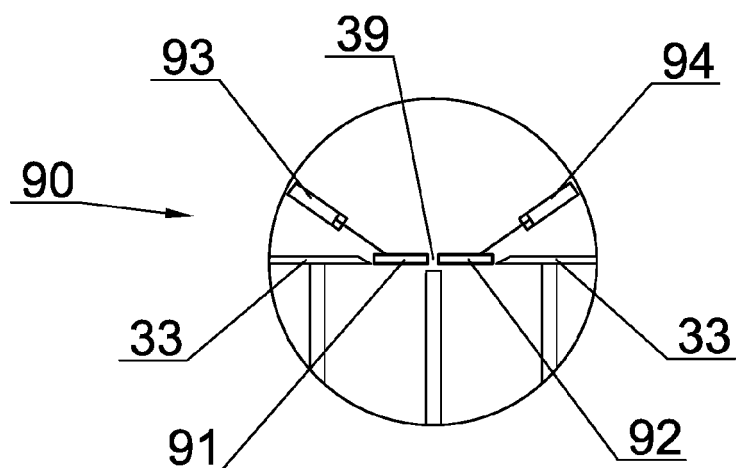


Fig. 10

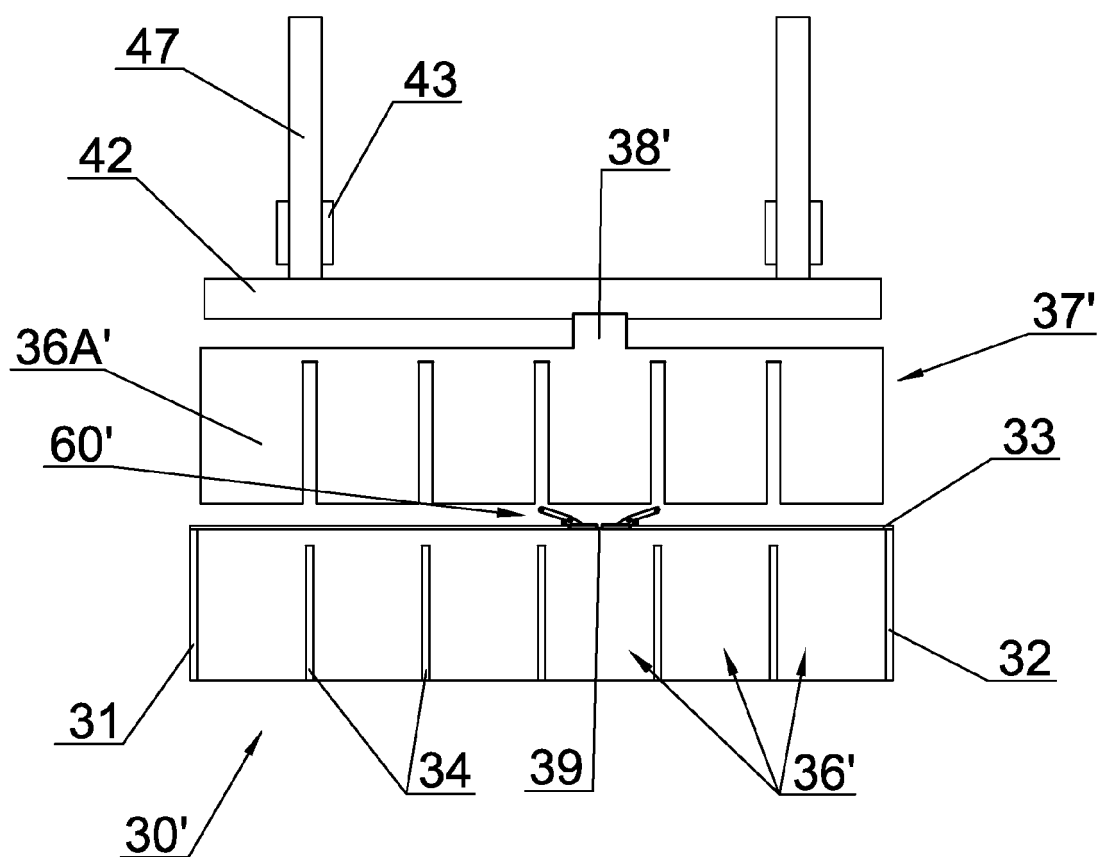


Fig. 11

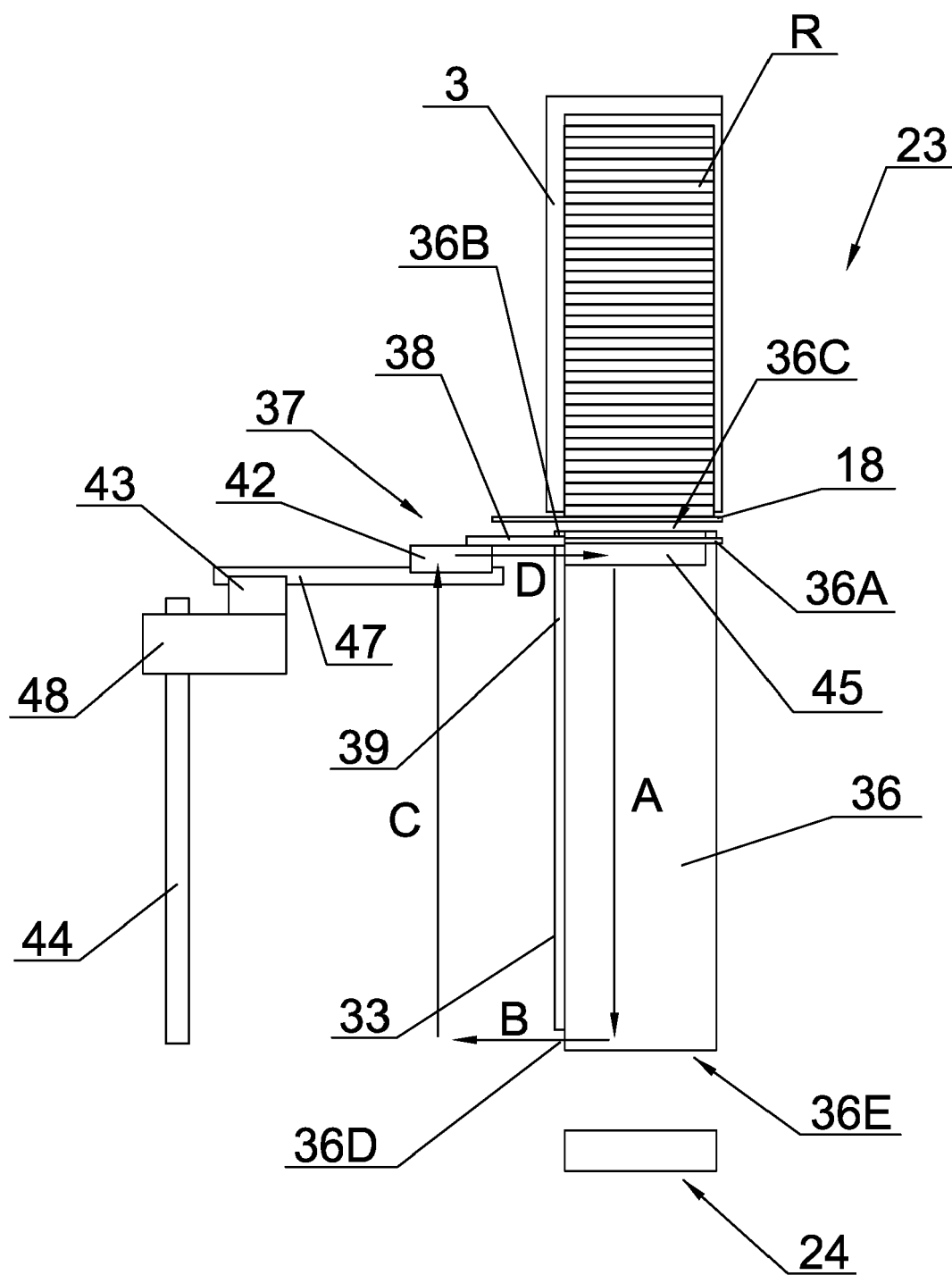
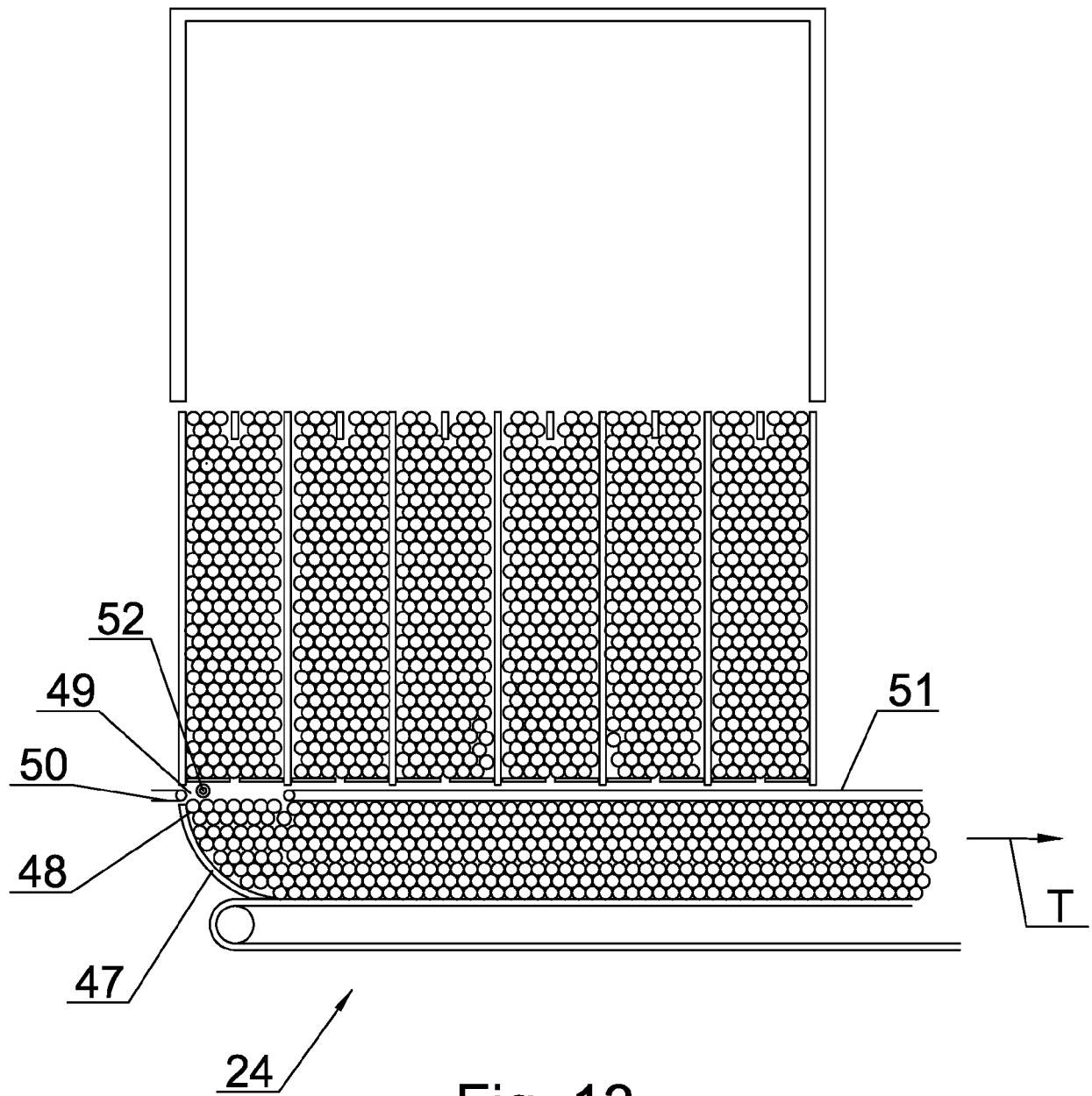


Fig. 12







## EUROPEAN SEARCH REPORT

Application Number  
EP 17 18 9650

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The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>23 February 2018</b>	Examiner <b>Kirchmayr, Katrin</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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**REFERENCES CITED IN THE DESCRIPTION**

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